Stanford University School of Medicine

A Legacy of Medical Innovation

A brief history of Stanford University School of Medicine: from its early years in San Francisco through the last four decades of leadership in education, patient care, and scientific achievement.

The year was 1959—the end of a postwar decade that launched the Space Race, produced the H-bomb, and spawned scientific discoveries ranging from the polio vaccine to the double-helix structure of DNA. For Stanford University School of Medicine, it was also the expansive beginning of a new era. In September 1959 Stanford moved its School of Medicine from San Francisco to a new 56-acre, $27 million medical center on the Stanford campus—reinventing its curriculum and attracting luminaries such as Nobel Prize-winners Joshua Lederberg, PhD, and Arthur Kornberg, MD, who chaired pioneering departments of genetics and biochemistry.

It was a visionary and pragmatic move. After half a century of making do with facilities divided between San Francisco and the Stanford campus, the School of Medicine would be, for the first time, both "physically and philosophically, an integral part of the University," as Stanford President J.E. Wallace Sterling explained. As a practical matter, medical students would no longer have to split their schooling between the home campus—where they took preclinical courses in anatomy, physiology, microbiology, and biochemistry—and Stanford Hospital, located 30 miles north on Sacramento and Webster streets in San Francisco, where they trained in pathology, pharmacology, and clinical practice.

Most importantly, the move to Palo Alto would foster ties among medical investigators, engineers, and basic physical and biological scientists at Stanford—links that were essential now that medicine was moving rapidly toward a new molecular understanding of life processes. Medical researchers had made profound strides since World War II, thanks to a postwar flood of federal, institutional, and private dollars. In an era of accelerating scientific knowledge and discovery, the School would be enriched by Stanford's strengths in fields such as physics and engineering, as well as the social sciences. According to Avram Goldstein, MD, chair of the Department of Pharmacology at the time, moving the School of Medicine to the Stanford campus, "made it possible for great things to happen."

The surge in scientific knowledge also sparked a reevaluation of Stanford's medical curriculum. It would clearly no longer be possible for individual physicians or students to master all the expanding techniques and facts of medicine. Preparing students in this new environment demanded a nontraditional approach, and the School of Medicine responded with a new plan for medical education. The innovative program featured a core medical curriculum liberally supplemented by independent study and elective work that would be chosen by individual students according to their interests. Teaching would

Levi Cooper Lane teaches in the surgical amphitheater of Cooper Medical College.

Cooper Medical College, located at the corner of Sacramento and Webster streets in San Francisco, is noted for its innovative approach to teaching.

Pioneering physician Elias Samuel Cooper (1820-1862) founds the first medical college on the West Coast.

emphasize the integration of the basic sciences and medicine, and students would spend much of their time pursuing research in specially designed, multipurpose labs. The goal, Goldstein noted, was to produce graduates who were accomplished investigators and who would bring their research training to whatever field of medicine they entered.

The most exceptional feature of the Stanford plan was extending the medical school program from four years to five, with a sixth year for those who wanted to earn both MD and PhD degrees. This longer program was especially unusual at a time when there was pressure to shorten the years that medical students spent in school. The plan's uncommon pace, flexibility, integration, and focus on research was a major departure from past practices of nearly every medical school in the nation.

A CENTURY OF INNOVATION

The plan—and the striking new medical center on the Palo Alto campus—continued traditions of innovation and investigation that had taken root a century before. The School traced its beginnings to the very first medical college on the Pacific Coast, opened in San Francisco in 1859 by the pioneering physician Elias Samuel Cooper. Located on the top floor of Cooper's office near Third and Mission streets, the Medical Department of the University of the Pacific offered instruction in medicine, pathology, chemistry, obstetrics, diseases of women and children, physiology, anatomy, surgery, materia medica, and medical jurisprudence.

Cooper, born in Ohio in 1820, was an original and fearless surgeon with a determined drive to work and teach. Since arriving in San Francisco in 1855, he had established a busy practice and earned a reputation as a successful innovator, performing daring surgeries and liberally using alcohol on instruments and wounds years before the introduction of antiseptic surgical techniques. In San Francisco's competitive medical circles, however, he made many adversaries. The fast-growing city of 57,000 was glutted with doctors—many, as one historian noted, "as spotted as the city's journalists, politicians, and bartenders"—and Cooper opened his school in the face of vocal opposition.

Nevertheless, he persevered and invited students from all over America to enroll. Nowhere else, he declared, were winds and climactic conditions so favorable for the practice of dissection. Moreover, with San Francisco's vice, disorder, and disease, the city had no lack of abundant and varied clinical material.

THE COOPER AND LANE LEGACY

Cooper's efforts were soon shared by his educated and industrious nephew, Levi Cooper Lane. In 1861, Lane, a graduate of Jefferson Medical College, joined his uncle's new medical college as a professor of physiology. Quick, cold, certain, and highly disciplined, Lane was a master anatomist and pathologist. Fastidious about germs, he donned protective clothing before entering the hospital and was renowned for his unusual surgical success.

Cooper, who suffered from facial paralysis and disabling pain in his extremities, died in 1862 at the age of 41. Lane then faced the financial challenge of keeping the school's doors open at the same time that another surgeon, H.H. Toland, was establishing a new medical college in the city. Doubtful that there would be enough students or material for two schools, the faculty of the Medical Department of the University of the Pacific joined the Toland faculty in 1864. It was a short-lived move, however; dissatisfied with their experience at Toland, Lane and other Cooper faculty withdrew and opened their own school—the Medical College of the Pacific—in 1870. A decade later Lane renamed the school Cooper Medical College in honor of his uncle and moved it to a new facility at Webster and Sacramento streets.

Lane was a major benefactor of the school, constructing the new five-story building with his own money, on land that he had donated. In 1890 he funded a large addition, and in 1894 he built Lane Hospital—an institution considered ahead of its time, equipped with modern chemistry, pathology, and physiology labs. Two years later he established the Lane Medical Lectures, which were popular public events in San Francisco. After Lane's death in 1902, his widow gave a third of her estate to the college to fund the Levi Cooper Lane Library of Medicine and Surgery, one of the leading medical libraries in the country.

Cooper Medical College developed a strong reputation for surgery, and in 1892 it was one of only seven schools in the country acknowledged by the English Royal College of Surgeons. "A remarkable group of western medical men formed the core of the Cooper faculty," recalled Stanford President Ray Lyman Wilbur, who had enrolled as a student at Cooper Medical College in 1897. On the other hand, he reported, classes were made up of "a rather unruly lot of Americans," varying greatly in age and experience, who booed and catcalled loudly if they disliked a classroom demonstration and noisily stamped their feet if they approved.

UNION WITH STANFORD

Many speculated that the independent Cooper Medical College might someday merge with Stanford University, whose Founding Grant declared medicine an important academic branch. Until 1900, Lane resisted this idea, determined to maintain Cooper Medical College as a successful, separate institution. Eventually, however, the costs of maintaining first-rate laboratories, faculty, and clinical facilities became too great for the medical school to bear. In 1906 Cooper authorities proposed a full transfer of the college to Stanford, and two years later a transfer agreement was adopted.

The new Stanford School of Medicine would incorporate Cooper's facilities as well as existing University departments—such as physiology, histology, embryology, and chemistry—and new departments of bacteriology, anatomy, and pharmacology. Medical instruction commenced on the Stanford campus in 1909. Cooper Medical College continued to graduate its students until 1912, when it was completely absorbed by Stanford University.

The new medical school divided its classes between the main campus—where students spent their first three semesters—and the former Cooper facilities in San Francisco, where they took their last five semesters of instruction. The curriculum stressed the importance of research—something of an innovation at the time—and Stanford was one of the first medical schools to recognize preventive medicine as a specialized discipline. The new school also instituted more rigorous graduation requirements, a move that led to an abrupt drop in applications.

The merger itself provoked considerable dissent. Many observers from the University of California—affiliated with Toland—opposed the new school, reprising the argument that there was no room for two medical schools in San Francisco. At the same time, many Stanford faculty thought the University had made a serious mistake by assuming this new academic and financial responsibility. In particular, John Casper Branner—who became Stanford's second president in 1913—"saw the medical school as a menace to the future of Stanford University with its limited endowment," noted Ray Lyman Wilbur, who was then serving as the medical school's dean. Partly to ensure the School's future in the University, Wilbur accepted Stanford's presidency when it was offered to him on Branner's retirement in 1916.

CHANGES AND CHALLENGES

Although the School's future was now assured, its day-to-day operation was quickly disrupted by World War I. Many faculty members and students went off to fight, and it was not until 1919 that returning veterans resumed their work and studies. Then in the 1920s the School commenced a series of academic changes—giving

Operating room in Lane Hospital in the early 1890s.

Class of 1940 poses for a graduation shot.

Technology allows physicians to gain a clear picture of human anatomy.

The linear accelerator, first used to treat a type of incurable eye cancer, is now used worldwide to treat many types of cancer.

Construction of the new medical school complex on the Stanford campus consolidates clinical and academic training programs.

Levi Cooper Lane (1828-1902) joins his uncle in 1861 to run the Medical Department of the University of the Pacific. He later uses his personal funds to construct the Cooper Medical College facilities.

students as much as 200 hours of "free time" during their first year, requiring all students to complete a thesis, and launching a new three-year residency training program in medicine, surgery, pediatrics, and obstetrics. The School's enrollment doubled, and research efforts flourished; some 1,300 research papers were published by Stanford medical school faculty between 1916 and 1933.

The Depression of the 1930s, however, took its toll. In San Francisco, approximately 12 percent of city residents were unemployed, with no money to purchase food, shelter, clothes, or medical care. Stanford Hospital had few patients, and for more than two years, two floors of the facility were closed. Conditions began improving when the federal government began relief activities in 1933, and the School benefited from the gift of a new medical research building. By the end of the decade, Stanford medical school was again "a happy ship," recalled Loren Chandler, MD, dean of the School from 1933-53.

With the bombing of Pearl Harbor and the declaration of war in 1941, conditions changed radically again. The military had a pressing need for young physicians, and Stanford medical school, like other institutions, launched a grueling continuous teaching program. Under the "9-9-9 Medical Plan," the academic year began in September 1941 and continued for nine months until June 1942; the very next week, another academic year began.

This intensive schedule produced five classes of graduates in just four years, but the strain on the medical school staff was huge. Some 35 percent of the faculty were away on military duty. Those remaining had to cope with "the concentration of subject matter, the continuous teaching program without vacations, the minimum faculty doing the work," Chandler remembered. Medical students were stretched thin, too—undergoing military training as well as their medical school studies—adding to the "atmosphere of rush, short-cuts, excitement, and, at times, deep frustration on the part of everybody involved," Chandler noted.

POSTWAR EXPANSION AND OPPORTUNITY

By the time the war ended in 1945, the country's medical schools had prepared 36,000 young doctors for the Armed Forces in just four years. But there was little let-up for the School of Medicine, once the 9-9-9 Medical Plan ended, since the school was deluged with students entering or reentering medical school under the G.I. Bill.

The enrollment surge was followed by the postwar research boom. The School of Medicine expanded research activities, spurred by faculty interests and funds from the federal government, foundations, and private gifts. Stanford's pioneering cardiovascular laboratory, created in 1949, helped spark interest in the new specialty of heart surgery and encouraged surgeons, radiologists, physiologists, chemists, and others to collaborate on experimental

work. In 1956, Stanford surgeons, led by Frank Gerbode, MD, performed their first open-heart operation, using an artificial heart-lung machine built by a Stanford team. In the mid-1950s the medical school achieved a milestone in cancer therapy when radiologist Henry S. Kaplan, MD, teamed with Edward L. Ginzton, PhD, director of the microwave laboratory in Stanford's physics department, to create the first six-million-volt linear accelerator to be used for cancer treatment in the Western Hemisphere. The device—installed in the medical school in 1955—is now used worldwide to treat Hodgkin's disease and other forms of cancer.

Other faculty clinicians also made important contributions, including surgical innovators Leo Eloesser, MD, and chief of surgery Emile Holman, MD, who improved treatment of respiratory distress in neonates; obstetrics/gynecology chief Ludwig Emge, MD, an expert on the relationship of hormones and cancer; chief of pediatrics Harold Faber, MD, who conducted crucial studies of poliomyelitis during and after World War II; radiology chief Robert Reid Newell, MD, an expert in radiation-induced cancers and leukemias; and Albion Walter Hewlett, MD, who advanced knowledge of pathology and cardiac arrhythmias.

Stanford President Wallace Sterling and Provost Frederick E. Terman were helping to sow the seeds of Silicon Valley, and their vision for Stanford included a new state-of-the-art medical center on campus. In 1953 the Board of Trustees announced the decision to move the medical school to Palo Alto, and six years later the vast new medical complex was completed, including a 434-bed hospital owned jointly by the City of Palo Alto and Stanford.

But the transition to the new medical facility was not easy. Many Palo Alto physicians feared that Stanford faculty might infringe on their local practices. And while a number of renowned faculty members helped spearhead the move from San Francisco, many others declined to transfer to the Palo Alto campus. "Many of them were devoted teachers, but most were reluctant to leave their city practices," recalled Sidney Raffel, MD, a longtime medical school professor who moved to the Stanford campus to head new programs in bacteriology and pathology.

Under Robert Alway, MD, the School's energetic new dean, the San Francisco faculty was replaced by celebrated newcomers, such as Nobel laureates Kornberg and Lederberg; immunologist Halsted Holman, MD, from Rockefeller University; psychiatrist David Hamburg, MD, from the National Institute of Mental Health; and pediatrician Norman Kretchmer, MD, from Cornell. These were individuals, Alway said, who were "lifted by challenge" and would bring the School of Medicine "closer to the critical mass" needed for collaboration, discovery, and innovation. After six years of fundraising and planning—and half a century of separation—the School of Medicine and the University were at long last joined.

A clinical lecture in Lane Hall of Stanford University School of Medicine, San Francisco, [illegible]

60s

For Stanford medical school the 1960s opened with the momentum and excitement of a new enterprise. The spirit of possibility was heightened by the arrival of young, talented new faculty members—including five members of the biochemistry faculty from Washington University in St. Louis, who came to Stanford with Nobel Prize-winner Arthur Kornberg, MD, to found the School's new Department of Biochemistry. "We were given a completely free hand in designing our own department and facilities—an extremely attractive prospect, given the fact that we were all young and eager," recalled biochemist Paul Berg, PhD, who won the 1980 Nobel Prize in chemistry for his research in recombinant DNA.

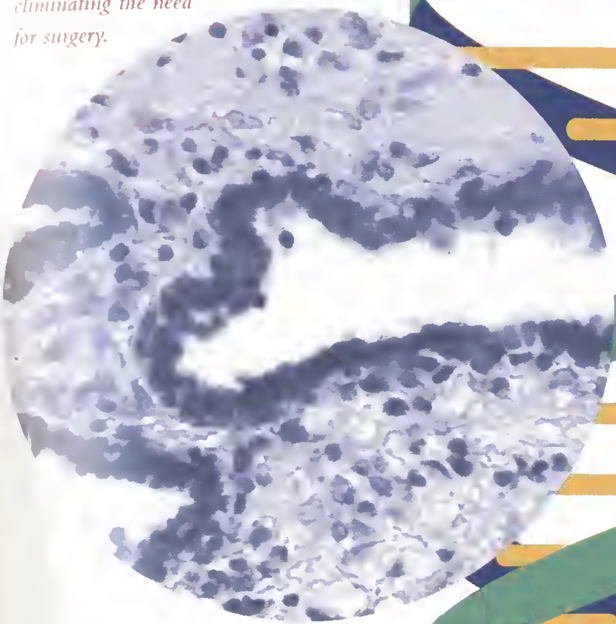
The infusion of new faculty was matched by a surge in funds from the National Institutes of Health and other agencies, as well as major private grants. From 1959 to 1970, income from annual federal grants alone jumped from $2.3 million to $14 million.

"In the '60s, Stanford was riding the crest of biomedical developments," recalled Halsted Holman, MD, who served as chair of medicine from 1960 to 1971. Henry Kaplan, MD, and Saul Rosenberg, MD, developed new techniques for treating cancer patients with a combined modality program of radiation and chemotherapy. Cardiovascular surgeon Norman Shumway, MD, performed the first triple heart valve surgeries and, in 1968, the first heart transplant in the United States. Senior Scientist Rose O. Payne, PhD, advanced tissue typing techniques for human organ transplants, ensuring genetic compatibility and enhancing the success of transplants. Judith G. Pool, PhD, senior research associate in the Department of Medicine, developed a technique for extracting the blood fraction needed to prevent bleeding in hemophiliacs. A team led by Kornberg produced the first test-tube synthesis of viral DNA displaying full biological activity. "All faculty members were engaged in investigation," Holman said, "and there was a real exuberance at Stanford as students joined faculty in investigative work."

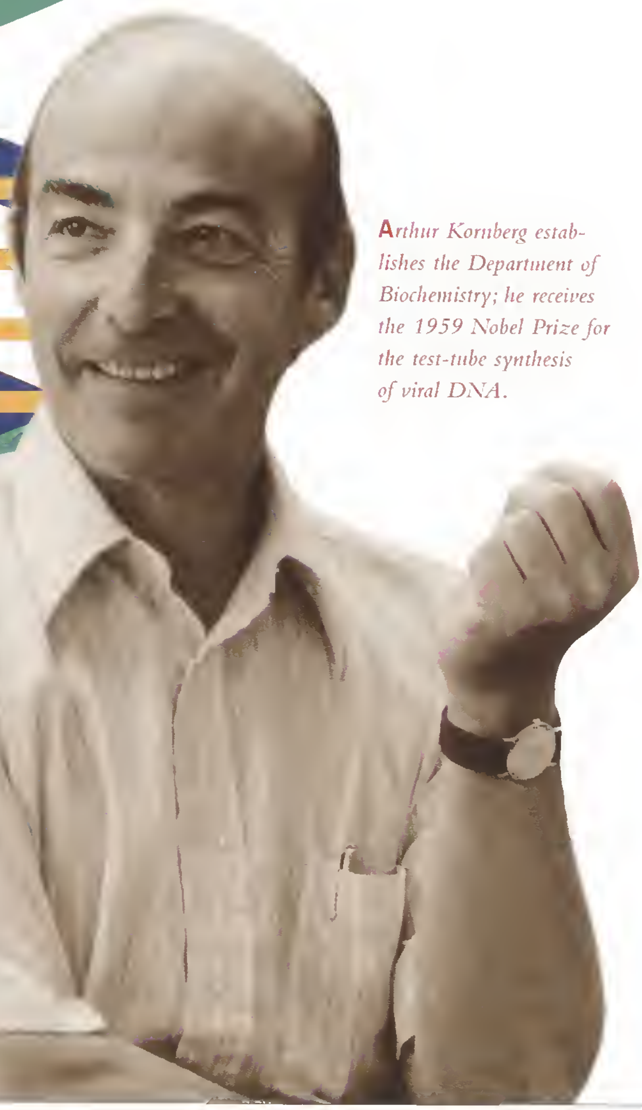
NEW TRAINING APPROACH

Excitement—and a sense of freedom—pervaded the School's curriculum, too. "We were abandoning old rules and encouraging students to do research with our unique five-year curriculum," Holman said. "No medical school had ever done quite the same thing." The student laboratories, especially, symbolized Stanford's commitment to train extraordinary MDs committed to research, according to Avram Goldstein, MD. Every student had a key to his or her own "home" laboratory and personal workspace. Almost all the introductory coursework was completed in these labs, and students had access to them day and night. Eating,

Prostate cancer cells are eradicated by a new type of radiation therapy, developed by Malcolm Bagshaw, eliminating the need for surgery.



Respiratory therapy is applied successfully to infants with hyaline membrane disease, a distress syndrome affecting more than 25,000 newborns each year.



Arthur Kornberg establishes the Department of Biochemistry; he receives the 1959 Nobel Prize for the test-tube synthesis of viral DNA.

The fruit fly (Drosophila melanogaster) is used by biochemist David Hogness to study molecular genetics and organ development, leading to advances in recombinant DNA technology.

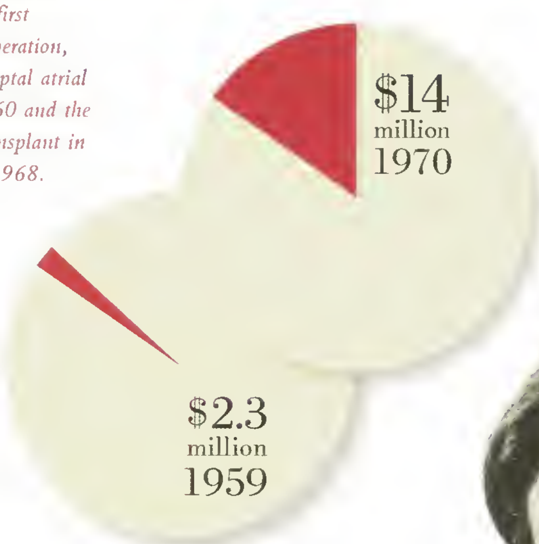
1960:
Hospital receives its first three-year accreditation

1960:
Alaska and Hawaii become states

1961:
National Cancer Institute gives Stanford a grant to establish a clinical radiotherapy center

1961:
Texas Instruments patents silicon chip

Norman Shumway performs the first open-heart operation, to correct a septal atrial defect, in 1960 and the first heart transplant in the U.S. in 1968.



Income from federal grants for research projects increases almost six-fold over the decade.

Judith Pool introduces a new technique for extracting the blood fraction needed to prevent bleeding in hemophiliacs.

1961:
Thalidomide birth defects reported

1961:
Berlin wall constructed

1961:
Peace Corps established

1962:
Stanford becomes first hospital on West Coast to use a computer for patient billing and accounting tasks

The new 56-acre medical school campus, designed by Edward Durrell Stone, takes four years and $27 million to build.

sleeping, and studying close to their research, medical students were "being exposed to the inquiring attitude in action," according to Geraldine Furhman, a research associate in the Department of Basic Medical Sciences.

As the School continued to recruit faculty and build its research and education programs, it gained a widespread reputation as a pacesetter. In 1967 Stanford University School of Medicine was cited by a British Royal Commission as one of five schools that had made dramatic curricular changes and pioneered new directions in training. "Everything at Stanford was brand new—the curriculum, the campus, and the faculty," recalled Ronald Levy, MD, chief of the Division of Oncology, who was a medical student at Stanford from 1963-68. "It was a time of experimentation, and it was a place where ideas, not traditions, were the driving force."

Nobel Laureate Joshua Lederberg, chair of the Department of Genetics, designs instruments for detecting life on other planets.

By the end of the decade, however, the exhilaration of the first years had been tempered by cutbacks in federal funding. Students also began clamoring for curricular reform; many were opting to spend their free time performing community service instead of laboratory research. Dissatisfied with what they characterized as the School's "DNA degree," they sought increasing emphasis

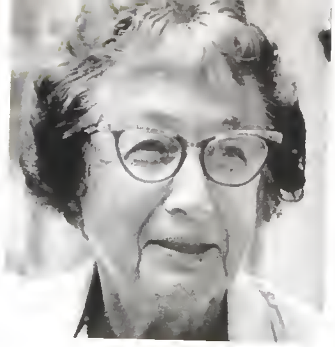
1962:
Cuban
Missile Crisis

1963:
Assassination of
President Kennedy

1963:
Martin Luther
King Jr.'s "I Have
A Dream" speech

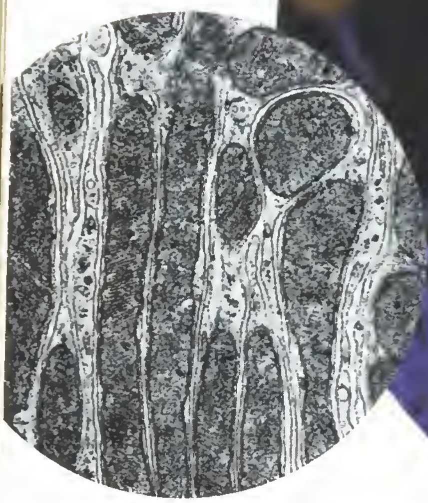
1964:
Surgeon General's
landmark report on
smoking and health

Student labs provide a unique, hands-on approach to medical education.



Rose Payne discovers the role of human leukocyte antigens in the immune system, leading to tissue matching techniques for organ transplants.

Reconstructing RNA opens new horizons in biological regulation, genetic replication, and protein synthesis.



Stanford's first kidney transplant operation is performed by Roy Cohn and Harry Oberhelman in August 1960.

Henry Kaplan teams with Saul Rosenberg to develop combined modality therapy, dramatically improving survival rates for patients with Hodgkin's disease.

1965:
Robert Glaser appointed dean

1966:
New Clinical Sciences Building dedicated

1966:
National Organization for Women (NOW) founded

1967:
Palo Alto-Stanford Hospital ranked among top 10 U.S. hospitals in national poll

on clinical work and social relevance in medical education. A consensus ultimately emerged among the faculty that an all-elective program would be an improvement to the original plan. In 1968 the School adopted such a system, eliminating all required core courses and offering students the option of earning a medical degree in three to four years instead of five. Because of space shortages and diminished interest, the student's former, "home" laboratories were eventually converted into departmental labs. To respond to student interest in community service, the School established a new Division of Community Medicine and developed links with nearby low-income community health centers.

CAMPUS RESTLESSNESS

Meanwhile, the war in Vietnam was escalating, and by the late 1960s, there was increasing social and political upheaval on the Stanford campus. "It was a terribly uncomfortable, unhappy time," remembered Robert Glaser, MD, who served as dean of the medical school from 1965-69. Although the School experienced considerably less disruption than the main University, students and faculty members took part in protests and raised issues of sexism and minority enrollment and employment on the campus.

The School was also grappling with the extraordinary challenges of running a teaching hospital that was owned and controlled jointly by the City of Palo Alto and Stanford. "The Palo Alto-Stanford Hospital, which we constructed in 1959, was literally divided in two parts—one owned by Palo Alto and one by the University," explained oncologist Saul Rosenberg, MD. "There were even two radiology departments. It was a strange and very complicated situation to deal with." Compounding the problem, the hospital lacked sufficient beds and operating rooms to accommodate the demanding practices of both faculty and community physicians.

In 1966 Stanford began negotiations to acquire the city's share of the hospital. Two years later, after lengthy deliberations, the sale was approved. Stanford University assumed full ownership under an agreement that permitted all community staff to retain their affiliations with the hospital for the rest of their professional careers. Stanford University Hospital—with its 437 patient beds, operating rooms, and laboratories—would now be fully able to support the School of Medicine's efforts in innovative patient care and medical education and advance its leadership role as a center of biomedical research.

1967:
Arthur Kornberg produces test-tube synthesis of viral DNA

1968:
Norman Shumway performs first heart transplant in U.S.

1969:
First man on the moon

1969:
Woodstock

70s

Freedom, discovery, controversy—and an awareness of limited resources—shaped the decade of the 1970s at the School of Medicine. "It was an extraordinary time," remembered Sarah Donaldson, MD, professor of radiation oncology. "There was tension because of national crises like the war in Vietnam and Watergate. But at the same time, amazing things were happening. We had sent men to the moon. The high-tech industry and Silicon Valley were beginning. Science was a terribly exciting place to be, and we had an enormous opportunity to be part of it here at Stanford."

FOCUS ON DISCOVERY

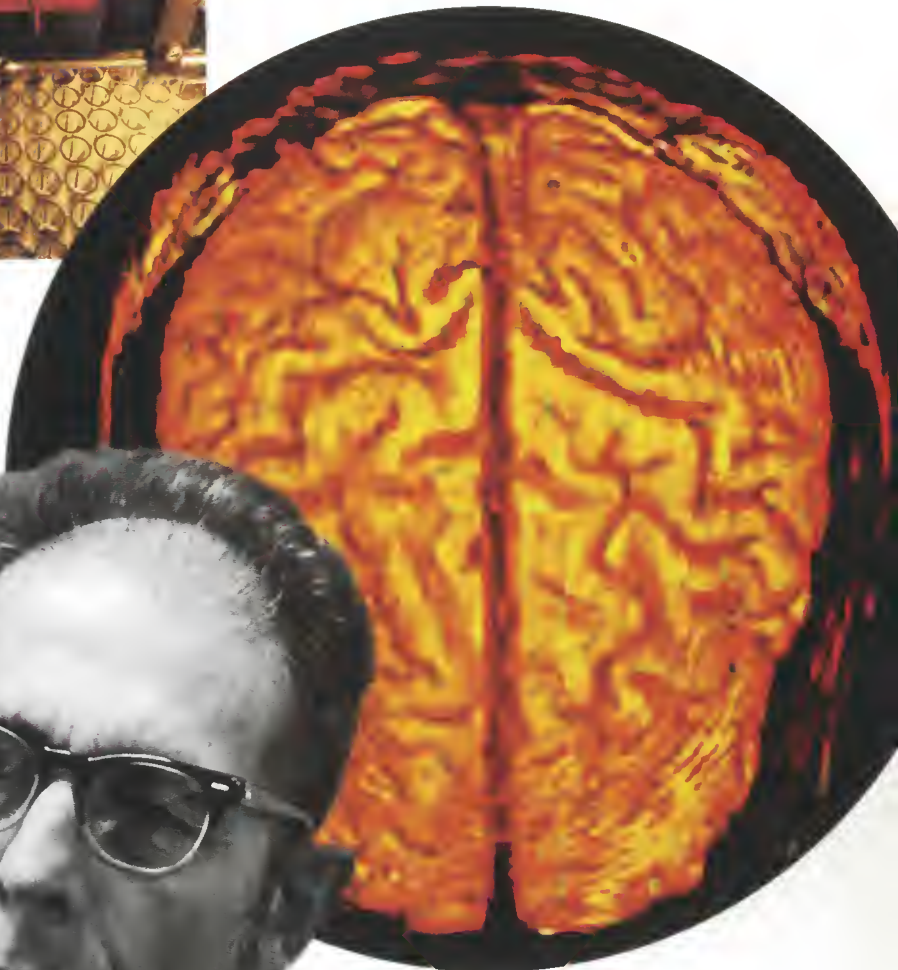
The medical school was "clearly and vitally focused on discovery," recalled Kenneth Melmon, MD, professor of medicine, who arrived at the School in 1978. Throughout the decade Stanford investigators acquired important insights into fundamental biomedical research. Pharmacologist Avram Goldstein, MD, pioneered research on brain receptors and the neurophysiology of addiction. Genetics professor Leonard Herzenberg, PhD, developed the fluorescence-activated cell sorter—a device that made it possible, for the first time, to isolate a particular cell type in a suspension containing millions of cells. Neurologist David Prince, MD, successfully recorded electrical signals from inside neurons, allowing closer study of brain disorders. Psychiatry and behavioral sciences professor William Dement, MD, uncovered key factors about the neurobiology and pathophysiology of sleep. And, in a breakthrough that resulted in the birth of the biotechnology industry, genetics professor Stanley Cohen, MD, with Herbert Boyer, PhD, of the University of California, San Francisco, demonstrated a practical technique for transplanting genes from one species to another.

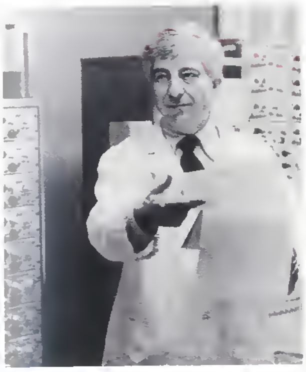
The School's researchers were also expanding interdepartmental links with Stanford's basic scientists and engineers. Medical and engineering faculty members, for example, partnered to explore the use of computers in patient monitoring and in the application of artificial intelligence to medicine.

CHANGES IN MEDICAL EDUCATION

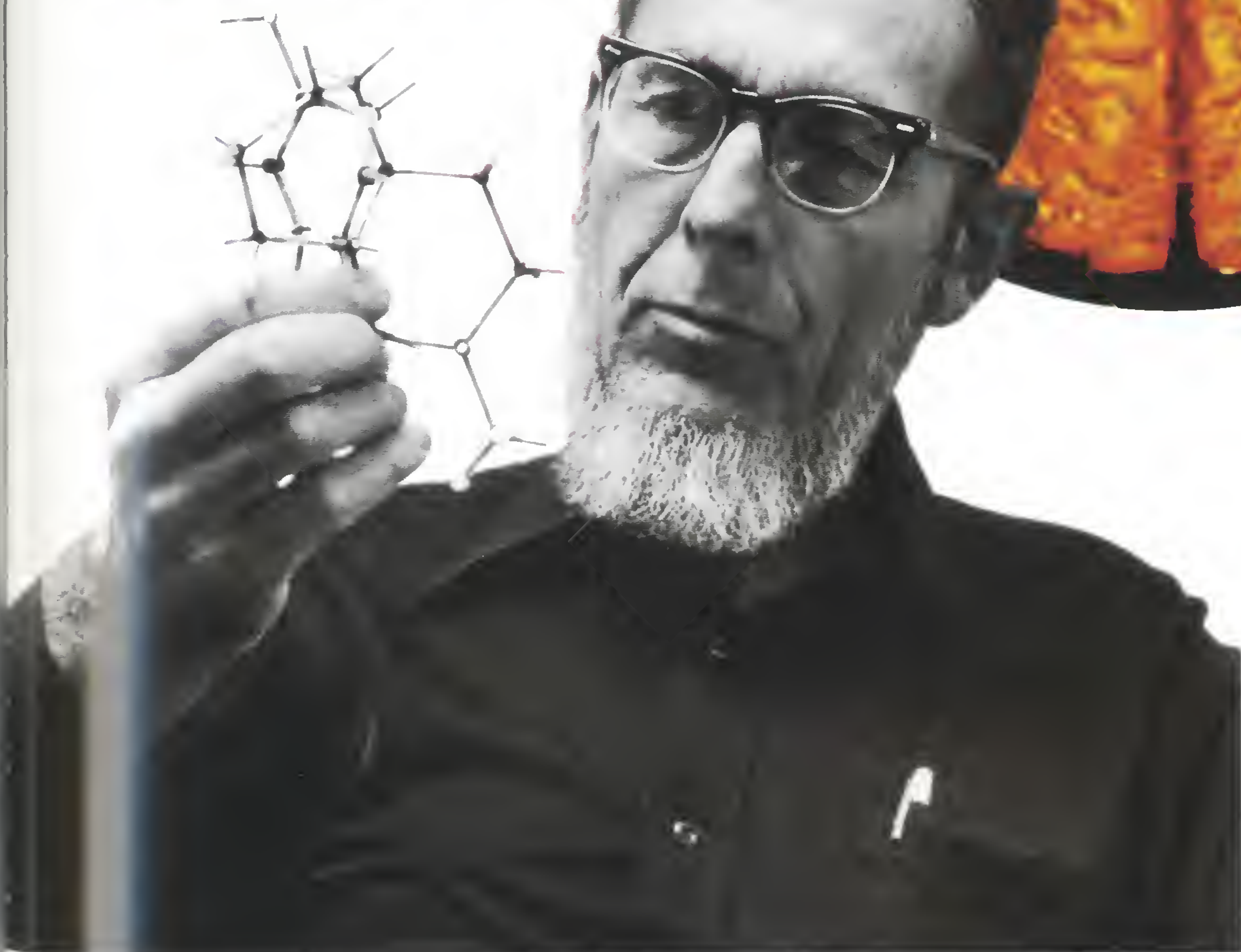
Educational collaborations flourished, too. Leading a cross-campus team, pediatrics professor Norman Kretchmer, MD, launched Stanford's Human Biology major—the first interdisciplinary course of its kind at any university—which combined undergraduate instruction in the medical, biological, and behavioral sciences. In addition, a new Clinical Scholars Training Program—a two-year fellowship introduced in 1974—focused on the nonbiological aspects of medicine, from law, ethics,

The fluorescence-activated cell sorter, developed by Leonard Herzenberg, revolutionizes the study of cancer cells.





Research in Stanford's Sleep Disorders Clinic, directed by William Dement, contributes to insights in sleep apnea, narcolepsy, insomnia, and sudden infant death syndrome.



Pharmacologist Avram Goldstein isolates opioids, "narcotic receptors" associated with drug addiction, as well as several key brain endorphins. Goldstein is also deeply involved in strategies to integrate clinical and scientific studies in the medical school curriculum.

1970:
Leonard Herzenberg develops the fluorescence-activated cell sorter (FACS)

1970:
First Earth Day

1970:
Kent State shootings

1970:
Student activism increases against the Vietnam War

1971:
The National Cancer Act is signed

and engineering to economics and social services.

Controversy continued, however, over the basic structure of the School of Medicine's curriculum. Stanford's all-elective program, instituted in 1968, gave medical students complete freedom to select any preclinical course of study they chose. While most students continued to opt for a relatively conventional array of courses, faculty members worried that some students were graduating from medical school without taking essential basic science and clinical courses. After extensive faculty debate, the School moved to reintroduce required courses in the middle of the decade.

Conflict also flared during the early 1970s over national debates such as the war in Vietnam and minority issues. In the spring of 1970, medical students and faculty members cancelled classes and organized protests in response to the U.S. invasion of Cambodia as well as the slaying and wounding of students at Kent State and Jackson State universities. A year later a 31-hour sit-in at the medical center—sparked by the denial of tenure to a Chicano professor and the dismissal of a black janitor—resulted in 22 injuries, 23 arrests, and some $100,000 in damage. School administrators shared with students a serious commitment to increase minority enrollment.

Halstead Holman steps down as chair of the Department of Medicine in 1971 and becomes director of Stanford's Arthritis Center, part of a national network to combat arthritis through research and education.

Nerve Growth Factor, a hormone crucial to the development of nerve cells, is isolated and crystallized by neurobiologist Eric Shooter.

1971:
Jane Goodall is visiting professor of psychiatry

1971:
Surgeon Intel invents microprocessor

1971:
Psychiatry Clinic Building completed

1972:
Watergate scandal, which leads to President Nixon's resignation

APRIL 1971

... Protests ... Campus

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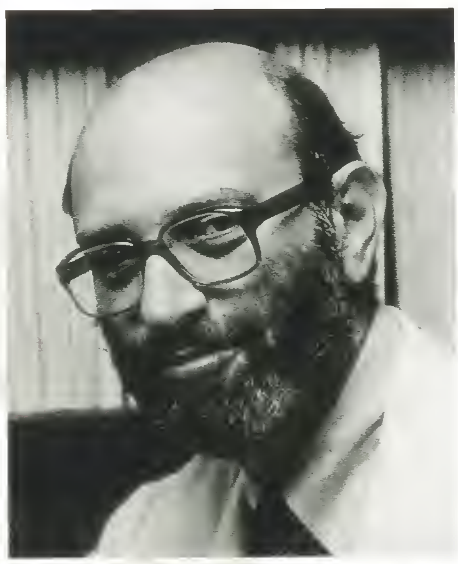
Above: Conflict lared during the early years over national debates such as the war in Vietnam and minority issues. In the spring,students and faculty members cancelled classes and organized protests in response to the U.S. invasion of Cambodia as well as the slaying and wounding of ... Kent State and Jackson State univer... ...e medical center sparked by the denial of tenure to a ...d the dismissal ... ...00,000 in damage. School administr...

Tension over the war in Vietnam and racial issues culminates in the arrest of 23 demonstrators and injuries to more than 20 people.



Stanley Cohen helps develop a practical method for transplanting genes from one species to another, opening the potential of genetic engineering – and the foundation of the biotechnology revolution. He later receives the Wolf Prize and the Lasker Award for his contributions to recombinant gene technology.

1973:
Stanley Cohen and UCSF's Herb Boyer successfully recombine DNA

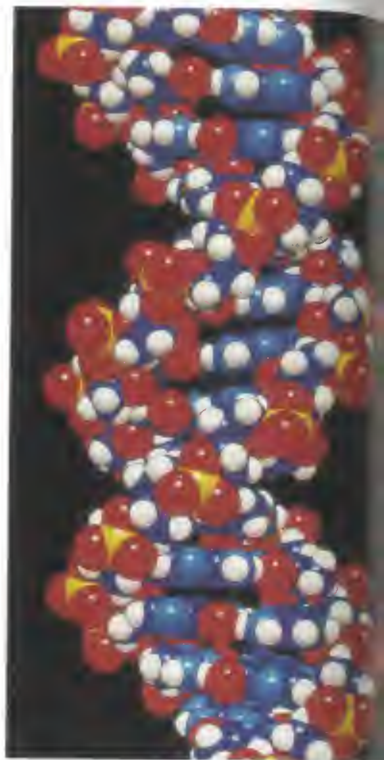
1973:
Vietnam cease-fire agreement signed

1973:
Oil crisis leads to gasoline shortages

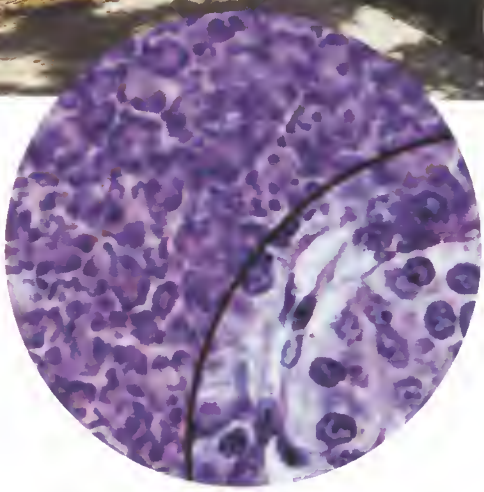
1973:
CT scanner developed

1973:
Roe v. Wade decision legalizes abortion

The Sherman Fairchild Center, with an adjacent 384-seat auditorium, houses the new departments of Neurobiology and Structural Biology and an expanded Department of Microbiology.



New insights into the mechanisms of DNA open the way for genetic-based investigations of disease.



The protein interferon is used in a study by Thomas Merigan to prevent common cold infections, leading to extensive studies of its use as an antiviral remedy.

Immunologist Hugh McDevitt discovers a new class of regulatory genes that controls the immune response to foreign substances.

1974:
School of Nursing closes after 77 years

1974:
Louis B. Mayer Cancer Biology Building dedicated

1976:
America's Bicentennial

1976:
Fairchild sciences building and auditorium completed

By the end of the decade, the number of minority students had increased to 22 percent of the incoming medical school class, and Stanford ranked fourth among the nation's 121 medical schools in minority admissions.

RENEWED GROWTH AND RENOVATION

Two decades after its move to the Stanford campus, the School and medical center also faced pressure to expand and upgrade teaching and medical facilities. A $12 million hospital expansion met pressing needs for improved laboratory, radiology, and surgical space. Renovations were made in the research facilities for the Department of Genetics, and new construction included the $1.2 million Louis B. Mayer Cancer Biology Building, the Debbie Probst Oncology Day Care Center, pharmacology labs, and the $10 million Sherman Fairchild Center, which was built to house the departments of anatomy, physiology, neurobiology, and structural biology.

By the end of the decade, however, the School still had an increasingly urgent need for expanded physical and financial resources. Costs were rising steadily. At the same time, funding sources were shrinking due to lowered federal financing for education, a nationwide drop in hospital admissions, and price controls limiting payment for medical services. Suddenly, Stanford and other academic medical centers were grappling with deficits, budget cuts, and the need to seek new sources of funding for medical education and research. It was a time, as Stanford President Richard Lyman described it, of "rapid change and great stress for medical research and education everywhere."

Despite these challenges the School continued to strengthen its reputation for excellence—establishing new programs in structural biology and the neurosciences and attracting new faculty leadership in core scientific and clinical fields. In 1979 a national survey ranked Stanford the second best medical school in the nation after Harvard. The School of Medicine was setting standards for fundamental scientific investigation, individualized training, and cross-campus collaborations with centers of teaching and research at Stanford and with biomedical enterprises. Poised for rapid advances in basic and clinical investigation, the School ended the decade preparing for the changes that were already reshaping medical education, health care, and research.

1977: **Hospital Core Expansion**

1977: **Balloon angioplasty used to treat obstructed arteries**

1978: First test-tube baby born in England

1979: Three Mile Island

80s

The 1980s unleashed profound changes that expanded the potential of medical science and transformed the delivery of health care. Scientific breakthroughs—from recombinant DNA technologies to new drug therapies and magnetic resonance imaging (MRI)—yielded dramatic improvements in diagnostic and treatment strategies. Much of this innovation originated at Stanford, positioning the Bay Area as a hub of the new biotechnology industry.

INNOVATION AND DISCOVERY

Recombinant DNA—the new gene splicing and cloning technology—was enabling important advances in research and therapeutic medicine, including mass production of human proteins such as insulin. In 1980 Stanford biochemistry professor Paul Berg, PhD, was honored with the Nobel Prize in chemistry for his research in recombinant DNA and the biochemistry of nucleic acids.

That year, Stanford and the University of California, San Francisco, also received a patent covering the gene splicing and cloning process developed earlier by Stanford genetics professor Stanley Cohen, MD, and UCSF's Herbert Boyer, PhD. The patent helped spur the fast-growing biotechnology industry—as well as vigorous debate over the link between academic medicine and business—and created new streams of funding for the School of Medicine.

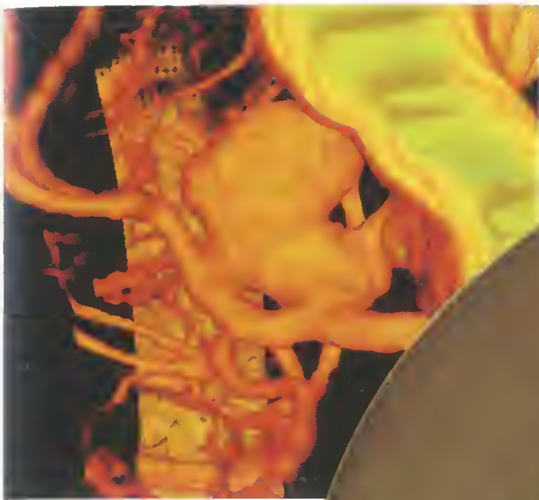
Another promising medical frontier was the study of monoclonal antibodies—proteins, known as biological response modifiers, that can boost a patient's ability to fight disease. In 1981 Ronald Levy, MD, professor of medicine, reported the first encouraging results of clinical studies using monoclonal antibodies to treat cancer.

To help translate new discoveries into new therapies, the School established the Arnold and Mabel Beckman Center for Molecular and Genetic Medicine in 1989. The Center housed a new department of developmental biology; the departments of biochemistry, and molecular and cellular physiology; and a Howard Hughes Medical Institute unit, facilitating university-wide collaboration among faculty members in the life sciences.

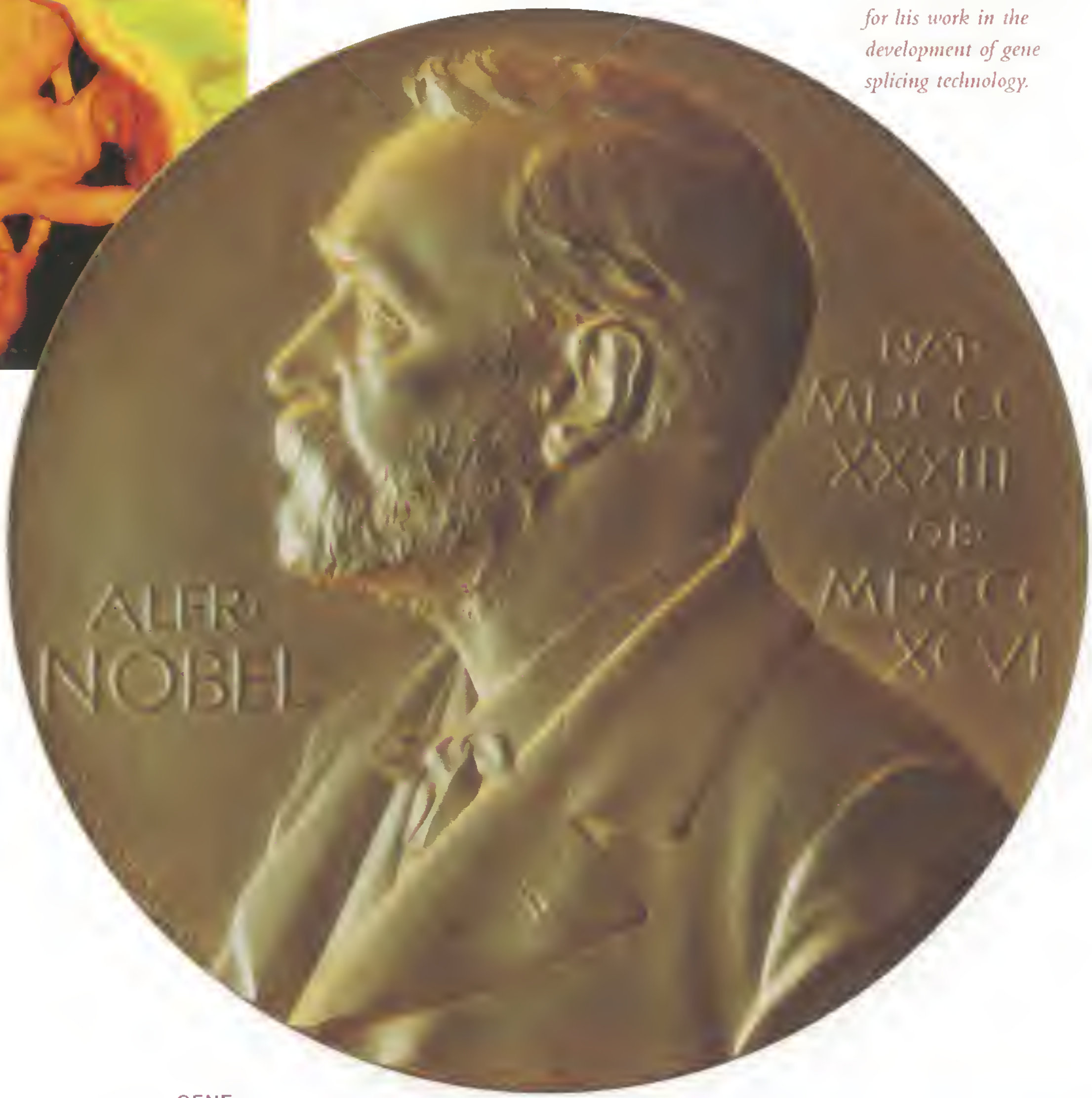
With the emergence of acquired immune deficiency syndrome (AIDS), medical scientists at Stanford added to the fundamental and clinical knowledge of the disease. Stanford pathologists devised a method that used monoclonal antibodies to detect the amount of infection-fighting T-cells in donor blood. Using this test, Stanford's blood bank became the first in the nation to screen blood for the presence of T-cells associated with AIDS.

FOCUS ON HEART RESEARCH

To integrate cardiovascular investigations, in 1984 the School dedicated the $14 million Dr. Ralph and Marian Falk Cardiovascular Research Center, housing the Department of Cardiovascular Surgery

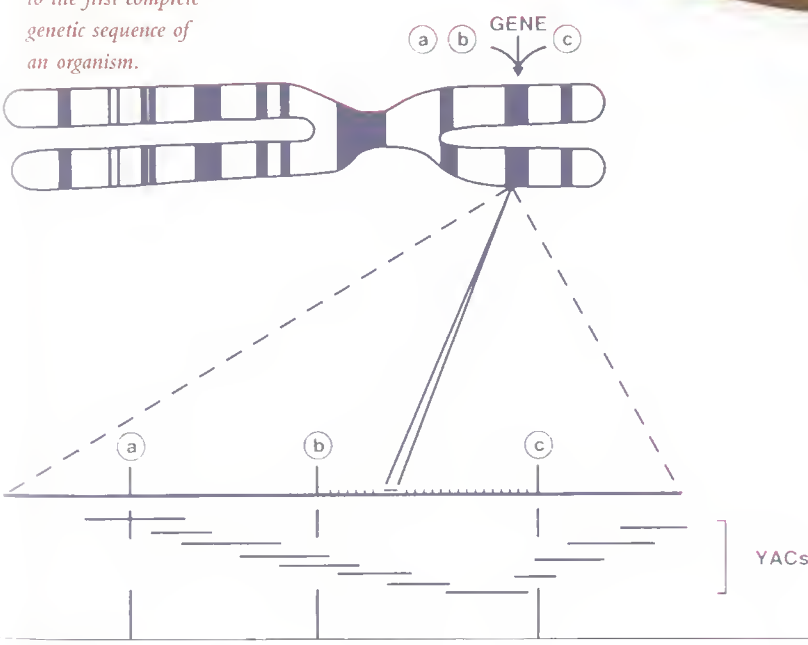


Neurosurgeons develop novel strategies to treat cerebral aneurysms.



Biochemist Paul Berg receives the Nobel Prize for his work in the development of gene splicing technology.

Geneticist David Botstein uses yeast to study tubulin cytoskeletons, leading to the first complete genetic sequence of an organism.



Irving Weissman uses cell separation techniques to isolate stem cells, precursor cells with the potential to differentiate into specialized cells. He will later separate stem cells from bone marrow, opening new potential for treating cancer and other diseases.

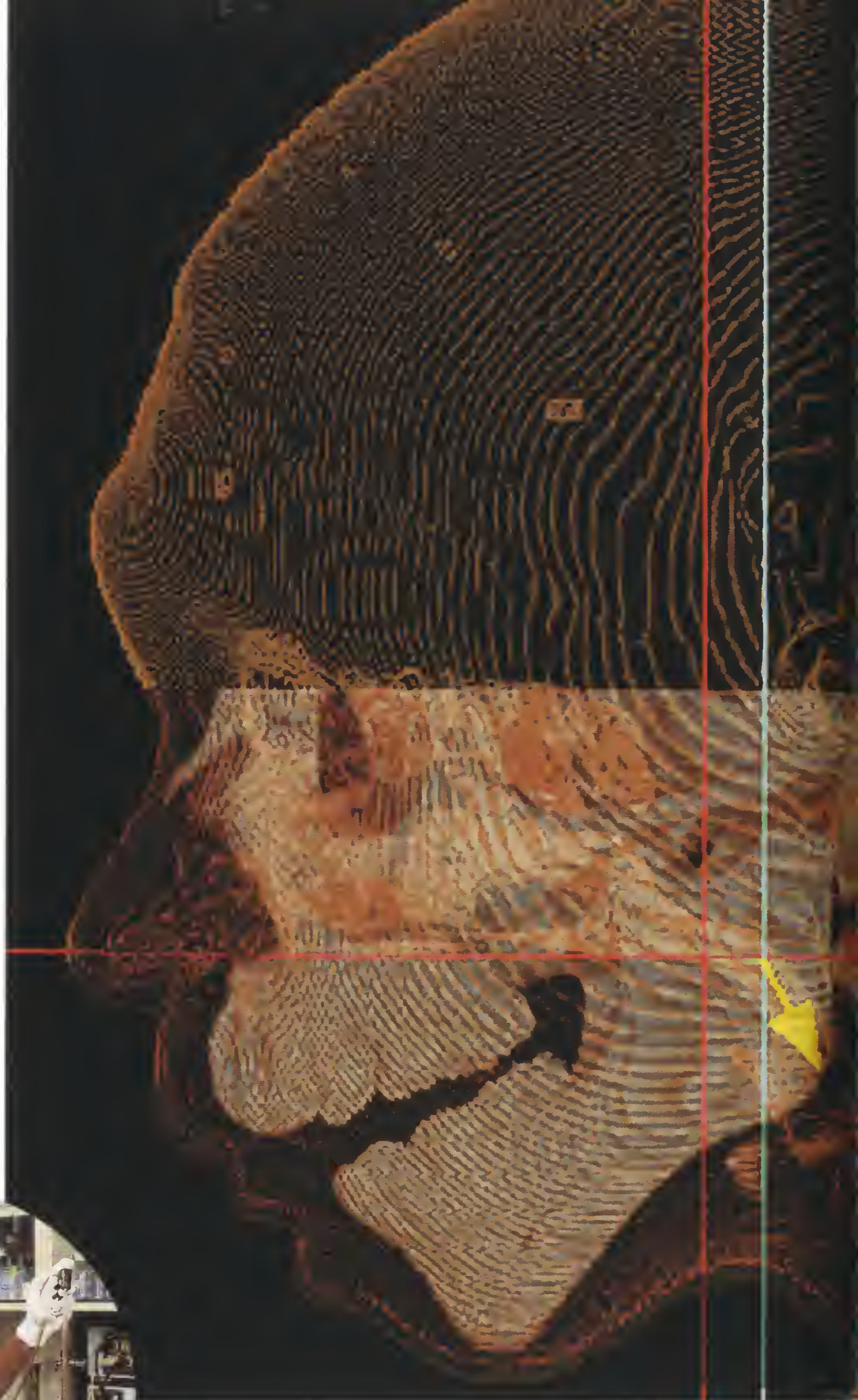
1980:
Paul Berg wins Nobel Prize

1980:
Mount St. Helens erupts

1981:
First AIDS cases recognized

1981:
IBM introduces "personal" computer

The Beckman Center for Molecular and Genetic Medicine opens in 1989, housing the departments of Molecular and Cellular Physiology, Biochemistry, Developmental Biology, and the Howard Hughes Medical Institute unit. The Center is designed to encourage collaborations among basic and clinical scientists.



Magnetic resonance imaging produces computer-generated images of cross-sections of the body or a single organ.

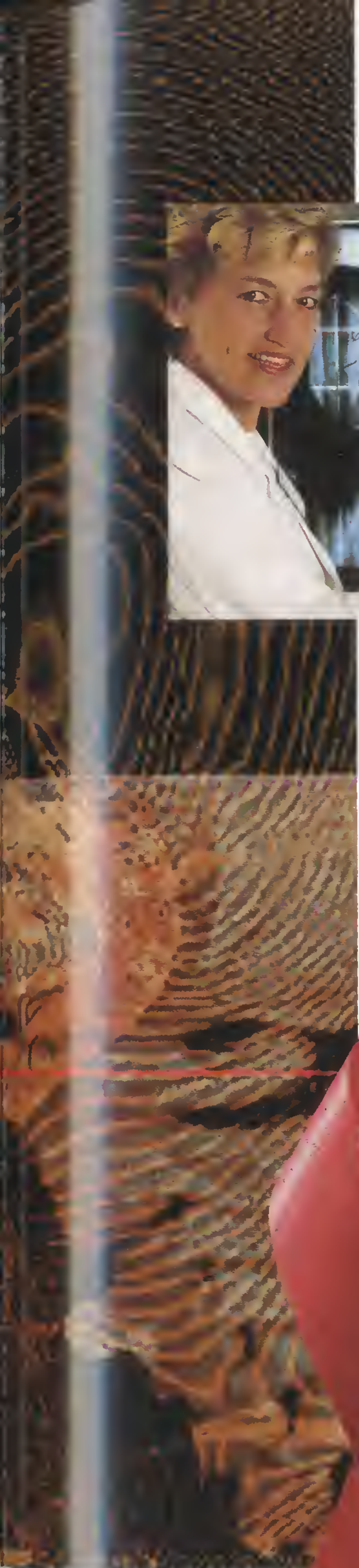
The Medical Student Scholars Program is created as part of the flexible curriculum to allow students to conduct basic science or clinical research under the guidance of a faculty mentor.

1981:
First space shuttle flight

1982:
Dominick Purpura appointed dean

1982:
First artificial heart implanted by William de Vries

1983:
LifeFlight helicopter services begin operations



By *combining radiation and chemotherapy, Sarah Donaldson and her colleagues in radiation oncology achieve a 96% survival rate for children with Hodgkin's disease.*

and the Division of Cardiovascular Medicine. Collaborating with physicists, biologists, computer scientists, and engineers, the medical school faculty pioneered research and treatment related to heart disease. In 1980, one of the first combined heart-lung transplants in humans was performed by a team led by cardiovascular surgeon Bruce Reitz, MD.

Diagnostic imaging technology advanced rapidly as well. Nuclear magnetic resonance technology—coinvented in the 1940s by Stanford Nobel laureate Felix Bloch, PhD, and Edward Purcell, PhD, of Harvard—had emerged as an important anatomical imaging tool, and Stanford established a new center to explore its applications in medical research and practice.

In 1983, Stanford also launched a $115 million hospital modernization plan to increase space and upgrade its facilities. Three years later, a $70 million gift from Lucile and David Packard financed construction of a new children's hospital, integrating and enhancing pediatric programs.

S*tanford's blood bank is the first in the country to screen blood for the presence of T-cells associated with AIDS.*

CHANGES IN HEALTH CARE

By the middle of the decade, however, a number of factors were threatening the financial health of the nation's academic medical centers. Costs of routine health care delivery were skyrocketing—

1983: **Hospital renovations**

1983: Donated blood tested for AIDS

1983: **Stanford alumna Sally Ride becomes first woman in space**

1984: **David Korn appointed dean**

partly as a result of new medical technology—and competition was increasing for patients and research funding.

With its threefold mission of patient care, education, and research, Stanford, like all academic medical centers, had higher costs than other care providers, a disadvantage in the new competitive environment. As Dean David Korn, MD, observed, the School of Medicine was suddenly "sailing in uncharted waters in a changing environment in which resources will be increasingly constrained and growth will be markedly reduced."

Throughout the 1960s and 1970s, the School of Medicine had focused on world-class biomedical research, and its clinical departments were comparatively weak—a shortcoming that Dean Korn was determined to correct. As part of a formal, faculty-based assessment, the School added curricular requirements and revitalized the departments of gynecology and obstetrics, psychiatry, surgery, radiology, and pediatrics. It also established a new Medical Center line in the professoriate, assigning equal rank to patient care, clinical teaching, and research.

In addition, reflecting the growing shift toward outpatient care, the School redesigned students' training, exposing them to treatment settings outside the "clinical classrooms" of the hospital. At the same time, there was a strong, continuing focus on research. Three-quarters of all medical students at Stanford participated in research, and by 1986, 65 percent remained at Stanford for at least one extra year to pursue research projects or practical clerkships.

By the end of the decade, the School was preparing for ongoing change by increasing financial discipline and encouraging collaborations among medical school and University faculty. It was also struggling with the physical effects of a major earthquake that shook the San Francisco Bay Area on October 17, 1989. Spyros Andreopoulos, director of the medical center's Office of Communications, was in the medical school office building when the quake struck at 5:04 p.m., rocking the newly constructed facility, he recalled, "like a ship during a major storm."

While the medical center suffered relatively little damage compared to other parts of the Stanford campus, some $30 million in earthquake damage was sustained by the Palo Alto Veterans Administration (VA) Medical Center, a facility closely linked to the medical school's clinical and academic programs. With a focus on rebuilding, and reorganizing for the new realities of health care, the School ended a decade of upheaval and extraordinary promise.

1984: Falk Building opens

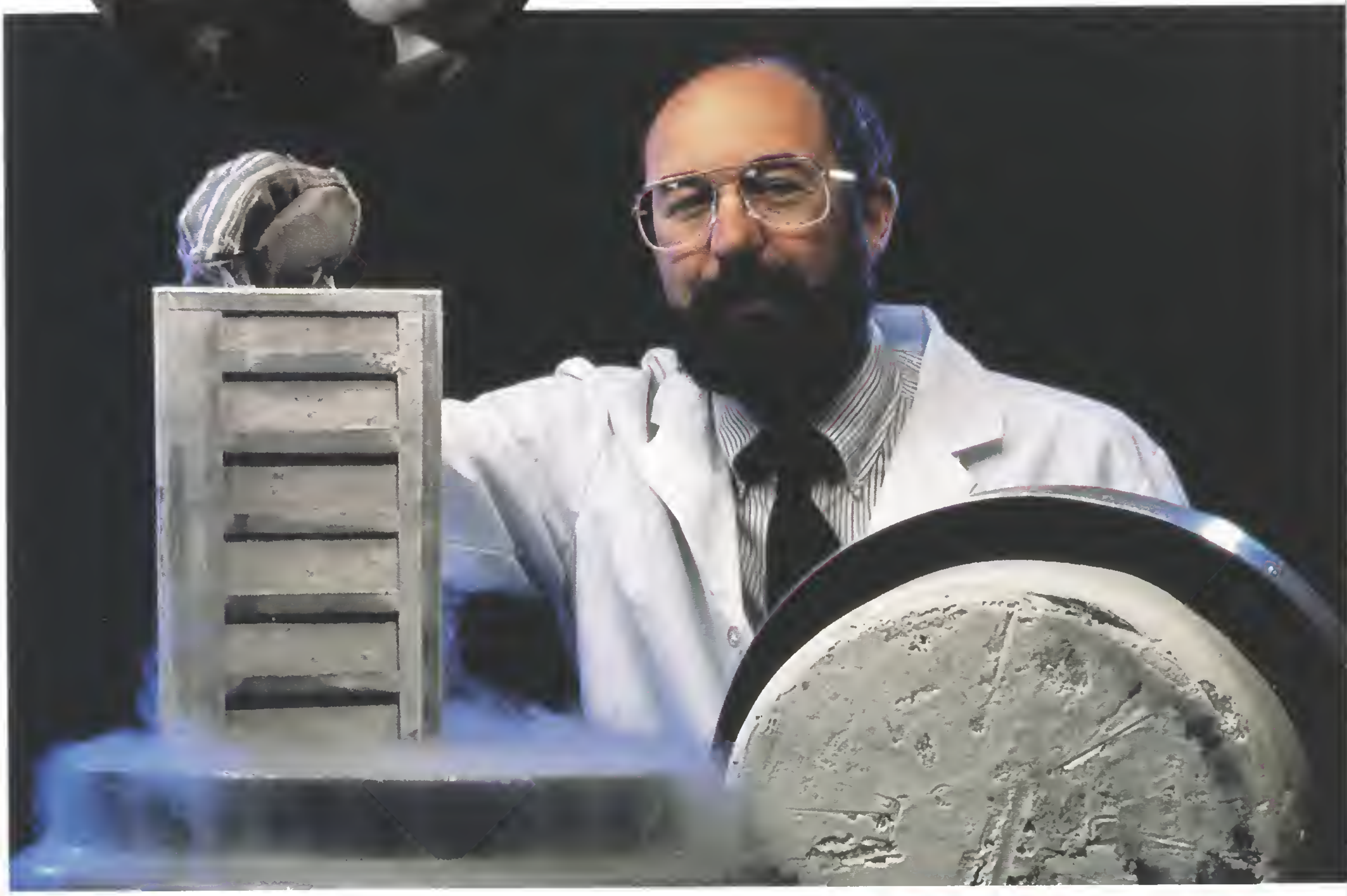
1986: Chernobyl nuclear disaster

1987: Stock market drops 500 points

1987: Baby M. trial about surrogate motherhood

Christopher Contag uses a molecular "light switch" called bioluminescence to observe gene activation in mammals.

Using monoclonal antibodies, Ronald Levy develops custom-made vaccines that stimulate the immune system to treat B cell lymphoma.



The Dr. Ralph and Marian Falk Cardiovascular Research Center is built to house heart-related research and training programs.

Cardiologists develop molecular and genetic strategies to treat coronary heart disease.

1989:
7.1 Loma Prieta earthquake strikes Bay Area

1989:
Beckman Center for Molecular and Genetic Medicine opens

1989:
Berlin Wall demolished

1989:
Tiananmen Square protests

90s

Despite continuing financial challenges, the 1990s was an era of momentous opportunity. Advances in technology fueled explosive growth in biological and biomedical discovery, especially in the accelerating fields of genomics and the neurosciences. At the same time, boundaries were blurring between basic research and clinical care, among scientific disciplines, and between the School of Medicine and industry, resulting in a wealth of innovative applications and collaborations.

THE HUMAN GENOME

Gene research emerged as a key area of biomedical investigation at Stanford. From the early 1990s, the medical school played a major role in the Human Genome Project, an international effort to decipher the entire genetic code of human beings. Genetics professors David Cox, MD, PhD, and Richard Myers, PhD, pioneered techniques for speeding genetic mapping in humans, including a powerful computer program that can instantly map thousands of genetic features.

In the Department of Biochemistry, Patrick Brown, MD, PhD, developed DNA-array chip technology that enabled the simultaneous analysis of thousands of genes arranged on a glass slide. And Ronald Davis, PhD, teamed with geneticist David Botstein, PhD, to help sequence the entire DNA of baker's yeast, an organism that is closely related to human cells.

Other Stanford investigators isolated a molecule that controls the formation of new bone and cartilage; determined how cell regulatory mechanisms affect drug delivery systems; and identified genes that cause a range of human diseases, from hypertension and narcolepsy to basal cell carcinoma, the most common form of human cancer.

"Throughout the decade," Botstein said, "we have made discoveries in basic biology that will have important relevance to improving health outcomes, therapy, and the diagnosis of human disease."

Charlotte Jacobs, MD, director of Stanford's Clinical Cancer Center, observed that increased understanding of cellular mechanics and genetics spurred "a tremendous interaction between basic scientists and clinicians at Stanford, leading to an exciting multidisciplinary approach."

TRANSLATIONAL RESEARCH

To promote collaborations among scientific and clinical investigators, the School of Medicine began construction of a new Center for Clinical Sciences Research (CCSR), which opened in May 2000. The center was designed to encourage "bench-to-bedside" research in the fields of immunology and transplantation, cancer biology, and applied genetics.

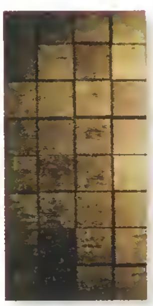
Other multidisciplinary programs flourished in the '90s, bringing together investigators from the schools of Medicine and Humanities and Sciences.

The Richard M. Lucas Center for Magnetic Resonance Spectroscopy and Imaging houses state-of-the art technology for exploring the diagnostic and research applications of nuclear magnetic resonance.

Urologist Thomas Stamey's calibration standards are adapted internationally for measuring prostate specific antigen (PSA), an important indicator of prostate cancer.

Matt Scott leads studies to identify the role of a gene called patched, which controls the growth of the cerebellum, in the development of a type of brain tumor.

The DNA chip, or array, developed by Patrick Brown, allows scientists to organize tens of thousands of genes at a time.



Immunosuppressant drugs that combat transplant rejection, developed by Randall Morris, are approved for human use by the FDA.

1990:
Hubble space telescope launched

1990:
Exxon Valdez oil spill

1990:
NIH launches Human Genome Project

1992:
Clinton elected president

**1992:
Lucas Center opens**

The Beckman Center's Program in Molecular and Genetic Medicine (PMGM) fostered an expanding number of collaborative projects in cell sciences, immunology, and human genetics, involving nearly 200 faculty members in more than 30 departments and divisions. And the Stanford Brain Research Center was organized to integrate the work of neuroscientists in 14 basic science and clinical departments.

In addition, a whole new field—bioinformatics—emerged during the decade, combining computer technology and biological sciences to probe the vast amounts of new biological and genetic data. A new biocomputation center was created to help faculty and students apply complex computing skills, including virtual reality technology, in medical practice and training.

Computer-based imaging techniques benefited many specialties. In cancer, for example, stereotactic radiosurgery was used to target the precise location of tumors, resulting in less damage to surrounding tissue. Imaging technology was also applied to understand brain functioning—uncovering differences, for example, in brain images of individuals with neurological disorders such as Alzheimer's disease and schizophrenia. At the Richard M. Lucas Center for Magnetic Resonance

John Adler establishes the country's first image-guided stereotactic radiosurgery suite and develops the Cyberknife, a frameless, computer-run system that precisely maps head and neck tumors.

Less invasive surgical techniques allow the use of novel medical devices, such as this intravascular ultrasound catheter, to treat coronary heart disease.

Branimir Sikic uses fragments of DNA, called antisense oligonucleotides, to stop the production of a cancer cell protein; blocking the protein production inhibits cancer growth in patients.

1994:
Lucile Salter Packard Children's Hospital opens

1995:
Bombing of Oklahoma City federal building

1995:
Eugene Bauer appointed dean

1996:
Matt Scott identifies gene for basal cell carcinoma

Lucile Salter Packard Children's Hospital at Stanford opens.

Lucy Shapiro plays a major role in establishing the field of microbial differentiation. Her lab determines the mechanisms of asymmetrical cell division and identifies the full genome sequence of the bacterium Caulobacter.

Chair of Surgery Thomas Krummel promotes the use of innovative virtual reality technology and realistic simulation programs to train surgeons.

1997:
Stanford merges clinical enterprise with UCSF

1997:
Dolly, the first cloned sheep

1997:
Johnson Center for Pregnancy and Newborn Services opens

Spectroscopy and Imaging, which opened in 1992, neuroscientists, psychologists, and radiologists began working together to map parts of the brain that are active during specific tasks.

Combined with advances in genetics and cellular biology, "these efforts are enabling major

Plans for a revamped medical school campus are approved, which will create a state-of-the-art education and research complex and a restructured library.

gains in clinical diagnosis and the understanding of brain function," observed neurobiology professor William Newsome, PhD.

To spur collaborative activity among the School of Medicine and other centers of research at Stanford, University leaders launched programs designed to link faculty and students in medicine, engineering, chemistry, physics, and biology.

FOCUS ON EFFICIENCY

While biomedical research advanced rapidly, financial pressures also intensified. The federal government cut its research funding substantially in the early '90s, alleging that Stanford had overcharged the government for indirect costs associated with federal research contracts. In 1994, the government concluded that Stanford had engaged in no wrongdoing, but the funding cuts resulted in a significant shortfall for the School of Medicine, which accounted for nearly half the University's federally sponsored research volume. In response, Stanford trustees approved a plan to reduce the School's administrative and academic expenses by as much as $22.2 million between 1991 and 1996.

Managed care pressures rose while clinical income continued to decline, leading Stanford to consider new ways to reduce costs. In 1997, the University merged its hospitals and clinics with the University of California, San Francisco—while leaving the medical schools separate—to combine the institutions' resources and bargaining power. The costs and difficulties of the merger proved greater than expected, however, and in April 1999 the universities dissolved the two-year partnership.

Despite financial difficulties, the School of Medicine continued to expand and improve facilities

1998:
Unabomber sentenced to prison

1999:
40th anniversary of medical school's relocation

1999:
Stanford Brain Research Center created

1999:
Concern over Y2K computer glitch

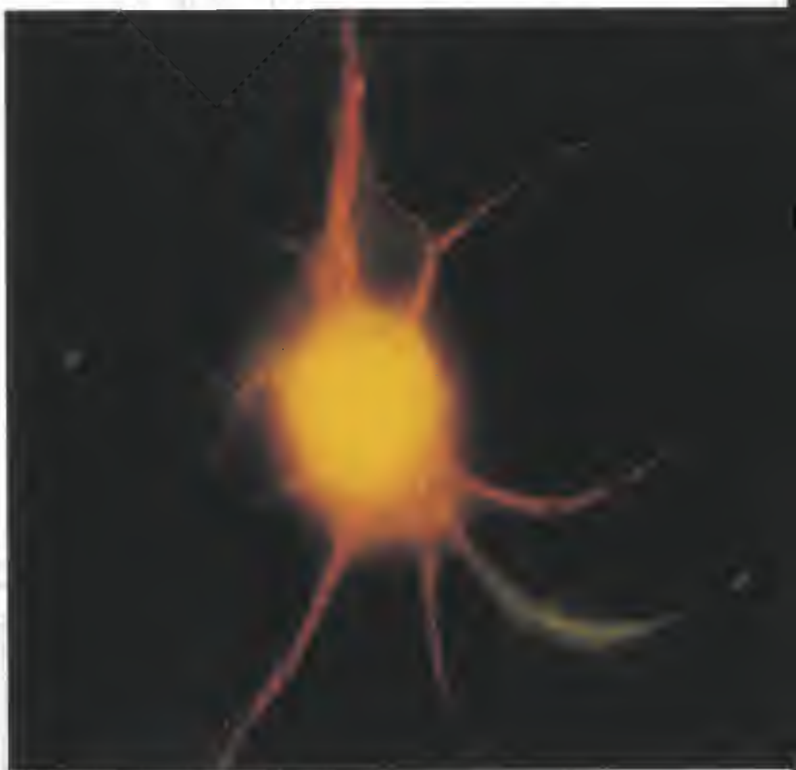
during the 1990s. Construction included a $4.9 million renovation of the Department of Genetics, a $30 million hospital renovation, and a new 75,000-square-foot academic and clinical building for the Department of Psychiatry and Behavioral Sciences.

In 1999, the University also approved a $185-million, five-year plan to overhaul the 40 year-old School of Medicine facilities. "Over the years, much of the School's physical maintenance had been deferred," said Harry Greenberg, MD, senior associate dean for research. "We will be remedying that and creating an educational environment for the future."

Improvements in physical structure reflected the renewal of the School's educational mission. In addition to curricular reforms planned for the next decade, academic changes in the 1990s included a shift in emphasis from disease treatment to wellness preservation and outpatient care, and a focus on ambulatory and chronic diseases.

Other academic trends reflected the increasingly multidisciplinary focus of biomedical and clinical science. A growing percentage of students combined medical degrees with degrees in engineering, business, and law, while more than 70 percent of students opted to stay for more than four years to pursue areas of individual interest.

The School also created new opportunities for students to gain early experience in academic-industry collaborations. "At Stanford," said Phyllis Gardner, MD, senior associate dean for education and student affairs, "we have an exciting opportunity for students to experience the academic-industry interface, to be exposed to what's going on around



Neurobiologists in Ben Barres' laboratory clarify the role played by glial cells in enhancing nerve cell connections in the brain.

Stanford in Silicon Valley" in biotechnology, information technology, bioinformatics, genomics, and combinatorial chemistry.

"There's a very 'can-do' attitude at Stanford medical school," said medical student Mike Ennen. "If there's an idea, it can be done. There's this sense that the sky's the limit, and that's an exciting atmosphere to be around."

1999:
Dissolution of UCSF Stanford Health Care

1999:
Gene for narcolepsy identified

1999:
World population reaches 6 billion

At the beginning of the new century, four decades after its move to the Stanford campus, the School of Medicine is fully applying its unique resources to the enhancement of scientific research, medical education, and patient care.

"The great strength of the School, for the past 40 years, has been its capacity to reinvent itself," says Eugene Bauer, MD, vice president for Stanford University Medical Center and dean of the School of Medicine. "Situated in the heart of a great research university, we are energized more than ever by creative links between basic and clinical sciences, between academics and industry, and across medical, scientific, and engineering disciplines."

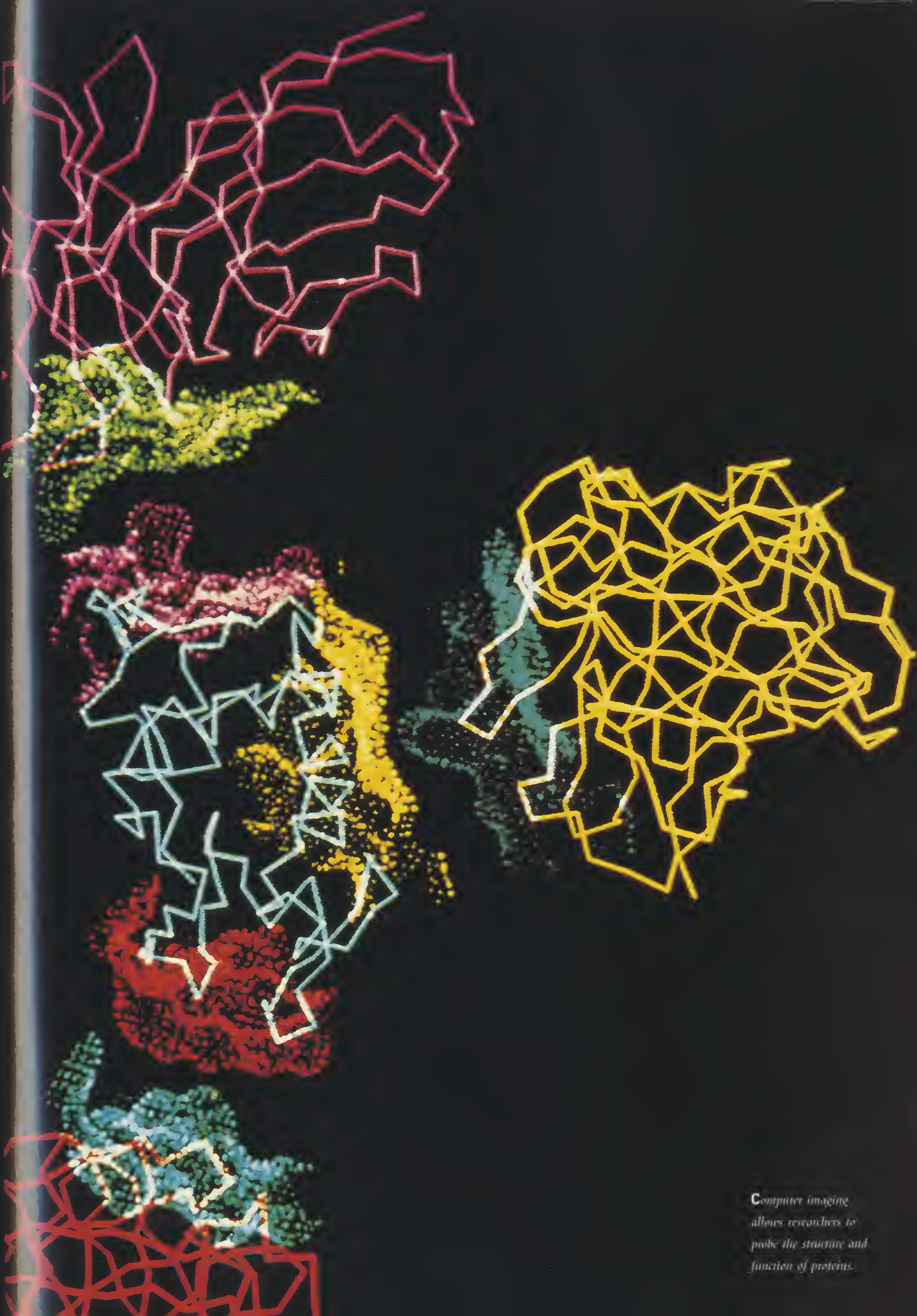
COLLABORATIVE RESEARCH

Today, adds Lucy Shapiro, PhD, professor of developmental biology, "the School is benefiting from a remarkable coalescence of the sciences across the entire Stanford campus." To nurture these cross-disciplinary links, bold new initiatives will bring together faculty and students from basic and applied sciences throughout the University. Building on Stanford's leadership in computer science, genetics, and technology, these initiatives will integrate scientific research and speed the application of new knowledge to human health.

A planned program in biocomputation, for example, will employ computer science and imaging to advance digital simulation and visualization of human cellular physiology, create genetic databases, and improve analysis of biomedical data. Tissue engineering—the development of artificial and replacement organs and tissues—will also be a major research focus, one with enormous potential for the treatment of injury, tissue degeneration, and disease.

With two NIH-funded genome centers, Stanford researchers will also continue to pioneer new knowledge in the fields of genetics and genomics. "The next challenge," explains David Botstein, PhD, chair of the Department of Genetics, "will be integrating and applying the vast amounts of new genetic data to prevent and treat human disease." New interdisciplinary research will focus on the study of gene function, the role of genetics in disease, and the development of new genetic approaches to treat and prevent illnesses such as cancer, cardiovascular diseases, and immunological disorders.

Stanford researchers will also be strengthening their leadership role in the neurosciences, building a program to enhance knowledge of the mental processes underlying cognitive functions such as perception, memory, and communication. A recent initiative, the Stanford Brain Research Center, coordinates the efforts taking place in a wide range of diciplines—from biological sciences, psychiatry, and neurology to cognitive psychology, engineering, and computer science. The Center



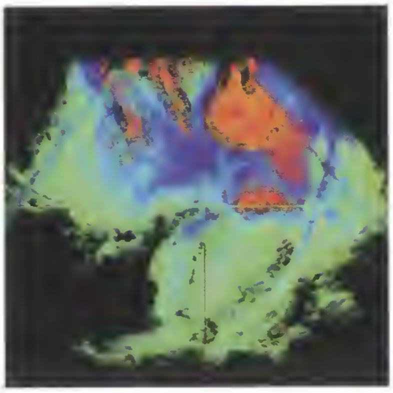
Computer imaging allows researchers to probe the structure and function of proteins.

Paul Yock and Thomas Andriacchi are spearheading collaborations among specialists in medicine, engineering, and the biomedical industry. The goal is to enable scientists to apply new technology to human biology.

The Center for Cancer Treatment and Prevention/Ambulatory Care Pavilion will provide consolidated outpatient services and the latest technologies to patients with cancer and other diseases.

"The curriculum will emphasize critical thinking and deep scholarship and will encourage Stanford students to differentiate themselves as leaders in the future."

Phyllis Gardner



New imaging techniques are being used to provide three-dimensional depictions of human anatomy, virtual reality images, and navigational tools that can provide neurosurgeons with extremely accurate representations of surgical targets and surrounding tissues and organs.

The Center for Clinical Sciences Research is designed to encourage research collaborations in human genetics, cancer, immunology, and transplantation.

encourages Stanford neuroscientists to work together to improve treatment of neuropsychiatric diseases as well as devastating disorders of the nervous system such as Alzheimer's and Parkinson's diseases.

APPLYING ADVANCES TO PATIENT CARE

Research in cardiovascular disease is also benefiting from new knowledge in the areas of genomics, molecular biology, engineering, and imaging technologies. Biomedical investigators at Stanford are exploring the genetic basis of heart disease and pioneering new clinical diagnostic and therapeutic methods and devices. Productive research relationships between University faculty and biotechnology companies have already resulted in many proven and promising noninvasive cardiovascular devices.

Cancer researchers, too, are focusing on the applications of new genetic and genomic knowledge. "Science is exploding before our very eyes," says Clinical Cancer Center Director Charlotte Jacobs, MD. "In cancer research today, we have enormous opportunities to translate new technologies and discoveries of basic science into promising clinical tools and therapies."

For example, researchers are developing computer methods to analyze the function of genes involved in cancer. They are studying innovative approaches for turning the immune system against cancer cells with the help of monoclonal antibodies and other immune system components and are

exploring the use of self-renewing stem cells in cancer treatment.

Investigators in oncology and many other specialties—including genetics, immunology, pediatrics, bone marrow transplantation, and molecular pharmacology—will have expanded opportunities to share ideas across departmental boundaries in the medical school's new Center for Clinical Sciences Research (CCSR), which opened in May 2000. Scientists in the CCSR are exploring the molecular and cellular mechanisms of human diseases—collaborating on research projects that focus on applied genetics, cancer, immunology, and transplantation in an open laboratory environment designed to encourage interdisciplinary exchange. Their work will help accelerate the applications of new biomedical research to the prevention and cure of the most challenging human diseases.

In addition, patient care will be enhanced by the new Center for Cancer Treatment and Prevention/Ambulatory Care Pavilion. The facility will accommodate the growing demand for outpatient services and enable specialists from many fields to work together to develop treatment strategies for patients with cancer and other diseases.

REVITALIZING EDUCATION

At the same time, the School of Medicine is refocusing its educational mission. As part of a five-year, $185-million construction plan, the School will overhaul its 40-year-old educational facilities, completing a new medical and graduate education building, upgrading research facilities, and renovating Lane Library. In addition, the School has reorganized and streamlined its student services office to provide more effective and comprehensive support for students.

Still ahead are major tasks, such as implentation of a revised clinical and preclinical curriculum. "Our goal," says Phyllis Gardner, MD, senior associate dean for education and student affairs, "is to create a very comprehensive, state-of-the-art, five-year curriculum that trains future leaders and creative thinkers in medicine, preparing them for a lifetime of continued learning."

AT THE LEADING EDGE

"Today, as never before, the School is capitalizing on the unique intellectual resources of this diverse academic community," Dean Bauer says. "Since we moved to this campus 40 years ago, Silicon Valley and the biotechnology industry have grown up around us. From the beginning, medical school investigators have been at the forefront of new advances in basic science, engineering, and medicine.

"Now, in our fifth decade at Stanford, the School of Medicine is entering another era of rapid change and promise. The vast expansion of biomedical knowledge will have a tremendous impact on research, education, and practice. On the threshold of these changes, we are positioning our research and educational programs to take advantage of the immense opportunities ahead."

STANFORD